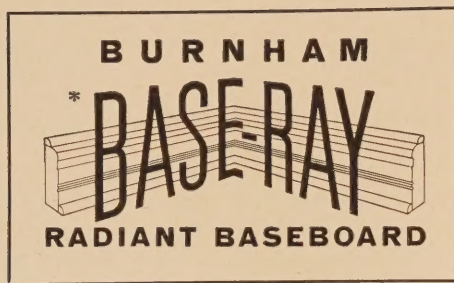


BASE-RAY — TACO RADIANT HEATING SYSTEMS

This Booklet illustrates the
joint use of products manufactured
by Burnham Boiler Corporation and
Taco Heaters, Inc.



*Registered trademark of Burnham Boiler Corporation

Better Heating - Better with Taco



TACO HEATERS, Inc., 342 Madison Ave., New York
In Canada: Taco Heaters of Canada, Ltd., 24 Adelaide Street W., Toronto

ASSOCIATE MEMBER OF THE INSTITUTE OF BOILER AND RADIATOR MANUFACTURERS

Base-Ray — "Taco-One" Venturi System

BURNHAM's latest development and announcement to the Radiant Heating conscious public is BASE-RAY Radiant Baseboards. Here at last is a heat source that is both decorative and efficient. This radically new concept of comfortable Radiant Heating comes from BASE-RAY Cast Iron Units. They are only 7" high and 1 3/4" thick and are supplied with hot water by the Taco Venturi System from the usual heating boiler. BASE-RAY replaces the wooden baseboards on one or more of the outside walls — usually extending the length of the room.

This easy to read booklet shows three different layouts for the same job. Used as a guide it will enable the heating contractor to figure quickly and confidently BASE-RAY jobs with Taco Hot Water Heating Specialties.

The engineering data in this booklet was evaluated

by the joint engineering staffs of Burnham Boiler Corporation and Taco Heaters, Inc.

BASE-RAY'S popularity with the heating contractor is based on three factors:

First, their customers are delighted with the even temperatures — the blanket of Radiant Warmth that BASE-RAY produces, eliminating all cold drafts. They also like BASE-RAY because it is so inconspicuous as to be practically invisible.

Second, BASE-RAY installations are designed and installed in the same manner as a conventional radiator system. No special complicated engineering methods to follow. The heating contractor therefore knows precisely what he is guaranteeing.

Third, no structural changes in the building itself are required. BASE-RAY can be readily installed in a new or modernization job.

Base-Ray — "Taco-One" System

The BASE-RAY "Taco-One" Venturi System uses only one main to carry hot water from boiler to BASE-RAY and back again. The simplicity of this system as shown by the design table is made possible by the efficient and quiet Taco Circulator. Only one Taco Venturi Fitting is required for each BASE-RAY Unit. This system permits Radiant Baseboards to be installed above or below the main. No balancing valves are required. (Except on double circuit installations.) Less pipe and fittings result in lower installation costs.

DESIGN TABLE FOR BASE-RAY "TACO-ONE" VENTURI SYSTEM

Maximum Sq. Ft. Base-Ray for Various Btu Emissions and Water Temperatures			Maximum Length of Pipe in longest Circuit	Flange Size of Taco Hy-Duty Circulator	Maximum Number of Venturi Fittings to Be Used Per Circuit		Pipe Sizes			Size of Venturi Fittings	Branch and Riser Pipe Size	Maximum Sq. Ft. Base-Ray per Venturi Fitting for Various Btu Emissions and Water Temperatures					
							Single Circuit	Two Circuit				*One Series Above Main			*Total Two Series Above Main or One Below Main		
150 Btu 170° Water	200 Btu 195° Water	240 Btu 215° Water						Single Circuit	Two Circuit			Trunk	Circuit	150 Btu 170°	200 Btu 195°	240 Btu 215°	150 Btu 170°
500	375	308			100	1"	12	10	1"			1¼"	1"	1"x1½"	½"	75	56
1000	750	625	125	1¼"	12	10	1¼"	1½"	1¼"	1¼"x½"	½"	100	75	63	80	60	50
1000	750	625	125	1¼"	12	10	1¼"	1½"	1¼"	1¼"x¾"	¾"	150	112	94	120	90	75
1000	750	625	150	1½"	12	10	1½"	2"	1½"	1½"x½"	½"	100	75	63	80	60	50
1000	750	625	150	1½"	12	10	1½"	2"	1½"	1½"x¾"	¾"	150	112	94	120	90	75

Increase laterals exceeding 8' one size from main to heel of riser. In most cases, not more than half total radiation should be installed below main. In no case should laterals to radiators below main exceed 9'.

* When two or more BASE-RAY Assemblies are connected together this is a "Series".

Example—In Living Room layout on Page 3 this is a Series made up of three BASE-RAY Assemblies.

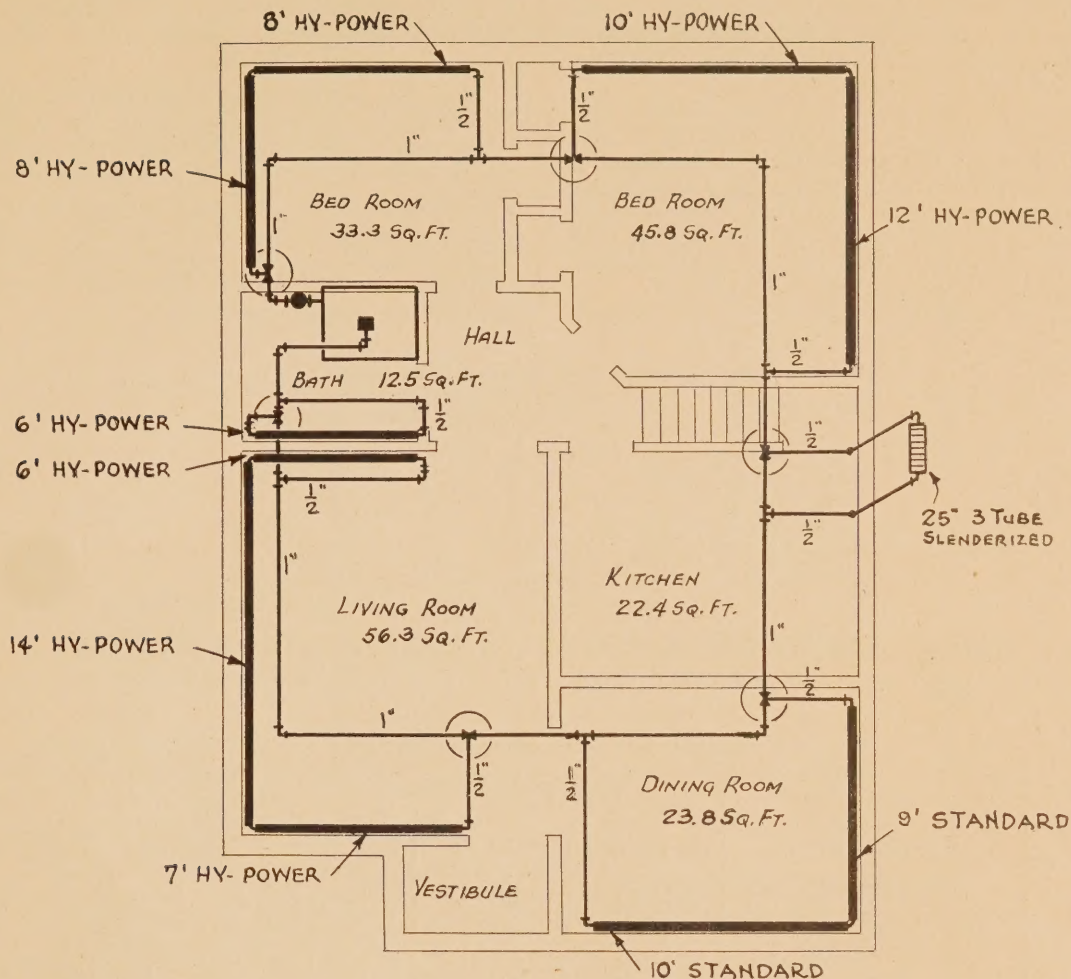
TACO-VENTURI FITTINGS

CAST IRON	
Screw connections	1" x 1" x 1/2" 1 1/4" x 1 1/4" x 1/2" or 3/4" 1 1/2" x 1 1/2" x 1/2", 3/4" or 1" 2" x 2" x 1/2", 3/4" or 1" 2 1/2" x 2 1/2" x 1/2" or 3/4" or 1"

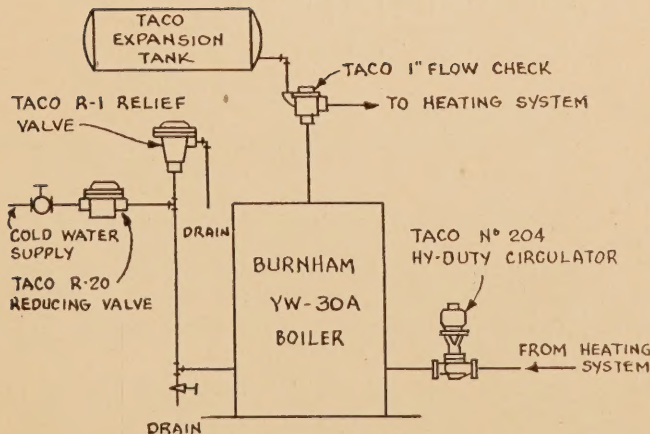
BRONZE	
Sweat connections for copper tubing types K, L, M	1" x 1" x 1/2" 1 1/4" x 1 1/4" x 1/2" or 3/4" 1 1/2" x 1 1/2" x 1/2" or 3/4" or 1"

Base-Ray—"Taco-One" Venturi System using 194.1 sq. ft., 200 btu emission

Typical Layout



Material List



- 1-YW 30-A Burnham Yello-Jacket Boiler
- 1-Biltin Taco Storage or Tankless Heater
- 147.9 Sq. Ft. of HY-POWER BASE-RAY
- 23.8 Sq. Ft. of STANDARD BASE-RAY
- 22.4 Sq. Ft. Three Tube 25" Slenderized Radiation
- 5-Pairs BASE-RAY Valve Enclosures
- 5-Corner Plates
- 7-BASE-RAY Center Supports

- 1-#204 Taco Hy-Duty Circulator
- 1-1" Taco Flow Check
- 1-R-1 Taco Relief Valve
- 1-R-20 Taco Reducing Valve
- 1-#15 Taco Expansion Tank
- 6-1x1/2" C.I. Taco Venturi Fittings
- 1-1/2" or 3/4" Taco Tempering Valve

- 97'-1" Pipe
- 65'-1/2" Pipe
- 8-1"x90° Elbows
- 12-1/2"x90° Elbows
- 12-1/2"x45° Elbows
- 12-1/2" Radiator Union Elbows
- 5-3/4" Radiator Union Elbows
- 5-3/4" Close Nipples
- 6-1"x1 1/2" Tees
- 11-Key Air Valves

Base-Ray "Mainless"—Taco System

(BASE-RAY used as Main)

THE BASE-RAY "Mainless"—Taco System uses BASE-RAY Radiant Baseboards as the main itself. This type of Radiant Baseboard installation offers the lowest cost Forced Hot Water Heating System available.

Note from the comparison chart shown below the small amount of pipe and fittings required on the "Mainless" System: Not only is there a considerable savings in materials but likewise a very substantial savings in labor costs. Bear in mind this comparison is between the BASE-RAY "Mainless" Taco System and the BASE-RAY—"Taco-One" System which heretofore was the most economical system to install.

Just imagine what this means to the home owner.

The most comfortable type of heating ever achieved. Only 3° differential between floor and ceiling—even in Zero weather—and in addition rooms now become more charming and livable.

With Taco's quiet and economical Circulator and "BASE-RAY Used As The Main" the comfort and convenience of Radiant Heating is now available for the small and the large home at moderate prices.

The design tables showing the Single and Two Circuit Installations listed below have been especially prepared for the heating contractor. With these tables "BASE-RAY Used As The Main" can be easily estimated with complete confidence.

Pipe and Fittings Comparison Chart

	BASE-RAY "MAINLESS" TACO	BASE-RAY "TACO-ONE"
Taco One Pipe Fittings.....	1	6
Pipe— $\frac{1}{2}$ — $\frac{3}{4}$ —1"	58	162
Elbows—90° and 45°	7	32
Radiator Union Elbows.....	15	17
Miscellaneous Fittings	12	11

DESIGN TABLES FOR BASE-RAY "MAINLESS"—TACO SYSTEM

Tables based on temperature drop in system of 20 F. Flow Rate 1 GPM per 10,000 Btu.

SINGLE CIRCUIT INSTALLATIONS

TOTAL HEAT LOSS.....	30,000 Btu						40,000 Btu					
	HY-POWER			STANDARD			HY-POWER			STANDARD		
BASE-RAY—TYPE.....												
EMISSION RATE—Btu.....	150	200	240	150	200	240	150	200	240	150	200	240
BASE-RAY—Sq. Ft.....	200	150	125	200	150	125	267	200	167	267	200	167
BASE-RAY—Lineal Ft.....	96	72	60	160	120	100	128	96	80	212	160	134
*TOTAL FRICTION HEAD against which Pump must work—Ft.....	4½	4	3½	6½	5½	4½	9½	8	7	14	11½	10
TACO CIRCULATOR—Size....	204	204	204	204	204	204	204	204	—	204	204	—

* Friction head based on using 1" pipe in connecting the boiler with the first and last BASE-RAY assemblies and $\frac{3}{4}$ " pipe between BASE-RAY assemblies.

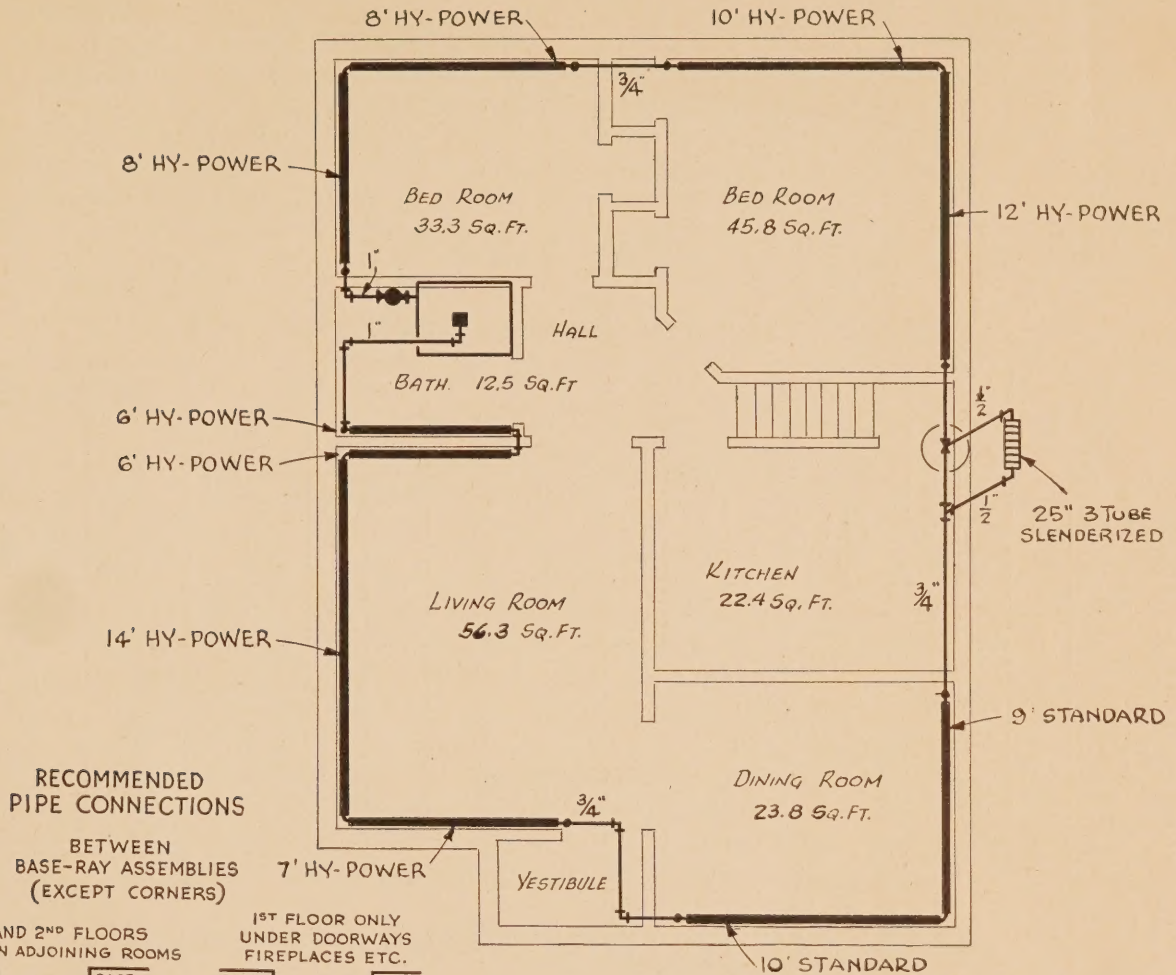
DOUBLE CIRCUIT INSTALLATIONS

TOTAL HEAT LOSS.....	40,000 Btu						50,000 Btu						60,000 Btu					
	HY-POWER			STANDARD			HY-POWER			STANDARD			HY-POWER			STANDARD		
BASE-RAY—TYPE.....																		
EMISSION RATE—Btu.....	150	200	240	150	200	240	150	200	240	150	200	240	150	200	240	150	200	240
BASE-RAY—Sq. Ft.....	267	200	167	267	200	167	333	250	208	333	250	208	400	300	250	400	300	250
BASE-RAY—Lineal Ft.....	128	96	80	212	160	134	160	120	100	266	200	167	192	144	120	320	240	200
†TOTAL FRICTION HEAD against which Pump must work—Ft.....	4½	4½	4	7	5½	5	7½	6½	6	10½	9	8	11	9½	8½	16	12½	11½
TACO CIRCULATOR—Size....	204	204	204	204	204	204	204	204	204	204	204	204	204	204	204	—	—	204

† Friction head based on 1" trunk, $\frac{3}{4}$ " pipe between BASE-RAY assemblies and with 70% of the Btu load on one circuit.

Base-Ray "Mainless"—Taco System using 194.1 sq. ft., 200 btu emission

Typical Layout



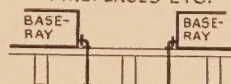
RECOMMENDED PIPE CONNECTIONS

BETWEEN
BASE-RAY ASSEMBLIES
(EXCEPT CORNERS)

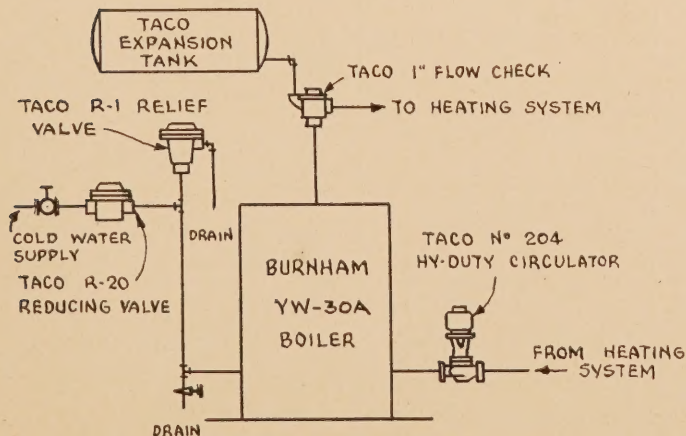
1ST AND 2ND FLOORS
BETWEEN ADJOINING ROOMS



1ST FLOOR ONLY
UNDER DOORWAYS
FIREPLACES ETC.



PLUGGED TEE



Material List

- | | |
|---|--------------------------------|
| 1—YW 30-A Burnham Yello-Jacket Boiler | 1—#204 Taco Hy-Duty Circulator |
| 1—Biltin Taco Storage or Tankless Heater 147.9 Sq. Ft. of HY-POWER BASE-RAY | 1—1\" |
| 23.8 Sq. Ft. of STANDARD BASE-RAY | 1—R-1 Taco Relief Valve |
| 22.4 Sq. Ft. Three Tube 25\" | 1—R-20 Taco Reducing Valve |
| 5—Pairs BASE-RAY Valve Enclosures | 1—#15 Taco Expansion Tank |
| 5—Corner Plates | 1—1x1/2\" |
| 7—BASE-RAY Center Supports | 1—1/2\" |
| 41'—3/4\" | |
| 14'—1\" | |
| 3—1/2\" | |
| 3—1\"x90° Elbows | |
| 4—3/4\"x90° Elbows | |
| 2—1\"x3/4\" Reducing Elbows | |
| 13—3/4\" Radiator Union Elbows | |
| 2—1/2\" Radiator Union Elbows | |
| 2—1\"x3/4\" Reducing Bushing | |
| 5—3/4\" Close Nipples | |
| 3—3/4\" Plugged Tees | |
| 11—Key Air Valves | |

Base-Ray—"Taco-Two" System

7 THE BASE-RAY "Taco-Two" System may be The Regular Two Pipe Direct Return or the Two Pipe Reverse Return System.

In the Reverse Return System the first BASE-RAY off the main is the last to return to the heating boiler.

The advantage of this system is that the length of the water circuit from the boiler through each BASE-RAY and back to the boiler is practically the same. Therefore the friction and temperature losses of each BASE-RAY should be approximately the same.

Both the conventional Two Pipe and Reverse Return System are easily adapted to BASE-RAY Radiant Baseboards or may be installed in combination with Burnham Slenderized or Burnham Radiant Radiators.

Since considerably more piping is required for either of these systems, the cost will be somewhat more than the BASE-RAY "Taco-One" Venturi System or the BASE-RAY "Mainless" Taco System shown on Pages 2 and 4.

DESIGN TABLE FOR SYSTEMS USING STEEL PIPE

Maximum Sq. Ft. Base-Ray for Various Btu Emissions and Water Temperatures			Single Circuit	Two Circuits	150 Btu 170° Water				200 Btu 195° Water				240 Btu 215° Water				TACO EQUIPMENT RECOMMENDED				
					One Series Above Main		Total Two Series Above Main		One Series Above Main		Total Two Series Above Main		One Series Above Main		Total Two Series Above Main		Taco Circulator	Taco Flow Check	Taco Relief Valve	Taco Reducing Valve	Taco Expansion Tank**
					1/2"	3/4"	1/2"	3/4"	1/2"	3/4"	1/2"	3/4"	1/2"	3/4"	1/2"	3/4"					
150 Btu 170° Water	200 Btu 195° Water	240 Btu 215° Water																			
400	300	250	1"	3/4"	133	over 133	100	over 100	100	over 100	75	over 75	83	over 83	63	over 63	204	1"	R-1	R-20	15
670	500	416	1 1/4"	1"	"	"	"	"	"	"	"	"	"	"	"	"	205	1 1/4"	"	"	18
1066	800	666	1 1/2"	1 1/4"	"	"	"	"	"	"	"	"	"	"	"	"	206	1 1/2"	"	"	24
1330	1000	832	1 1/2"	1 1/4"	"	"	"	"	"	"	"	"	"	"	"	"	206	1 1/2"	"	"	24
1666	1250	1040	2"	1 1/2"	"	"	"	"	"	"	"	"	"	"	"	"	206	2"	"	"	30
2000	1500	1250	2"	1 1/2"	"	"	"	"	"	"	"	"	"	"	"	"	206	2"	"	"	30
2666	2000	1664	2 1/2"	2"	"	"	"	"	"	"	"	"	"	"	"	"	2"	2 1/2"	"	"	30
3333	2500	2080	2 1/2"	2"	"	"	"	"	"	"	"	"	"	"	"	"	2 1/2"	2 1/2"	"	"	40
4000	3000	2500	3"	2 1/2"	"	"	"	"	"	"	"	"	"	"	"	"	2 1/2"	2 1/2"	"	"	40

DESIGN TABLE FOR SYSTEMS USING COPPER TUBING

Maximum Sq. Ft. Base-Ray for Various Btu Emissions and Water Temperatures			Single Circuit	Two Circuits	150 Btu 170° Water					200 Btu 195° Water					240 Btu 215° Water					TACO EQUIPMENT RECOMMENDED					
					One Series Above Main			Total Two Series Above Main		One Series Above Main			Total Two Series Above Main		One Series Above Main			Total Two Series Above Main		Taco Circulator	Taco Flow Check	Taco Relief Valve	Taco Reducing Valve	Taco Expansion Tank**	
					3/8"	1/2"	3/4"	1/2"	3/4"	3/8"	1/2"	3/4"	1/2"	3/4"	3/8"	1/2"	3/4"	1/2"	3/4"						
150 Btu 170° Water	200 Btu 195° Water	240 Btu 215° Water																							
400	300	250	1"	3/4"	80	166	over 166	146	over 146	60	125	over 125	110	over 110	50	104	over 104	92	92	204	1"	R-1	R-20	15	
670	500	416	1"	3/4"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	204	1"	"	"	18	
1066	800	666	1 1/4"	1"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	205	1 1/2"	"	"	24	
1330	1000	832	1 1/2"	1 1/4"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	206	1 1/2"	"	"	24	
1666	1250	1040	1 1/2"	1 1/4"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	206	1 1/2"	"	"	30	
2000	1500	1250	2"	1 1/2"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	206	2"	"	"	30	
2666	2000	1664	2"	1 1/2"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2"	2"	"	"	30	
3333	2500	2080	2 1/2"	2"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2 1/2"	2 1/2"	"	"	40	
4000	3000	2500	2 1/2"	2"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2 1/2"	2 1/2"	"	"	40	

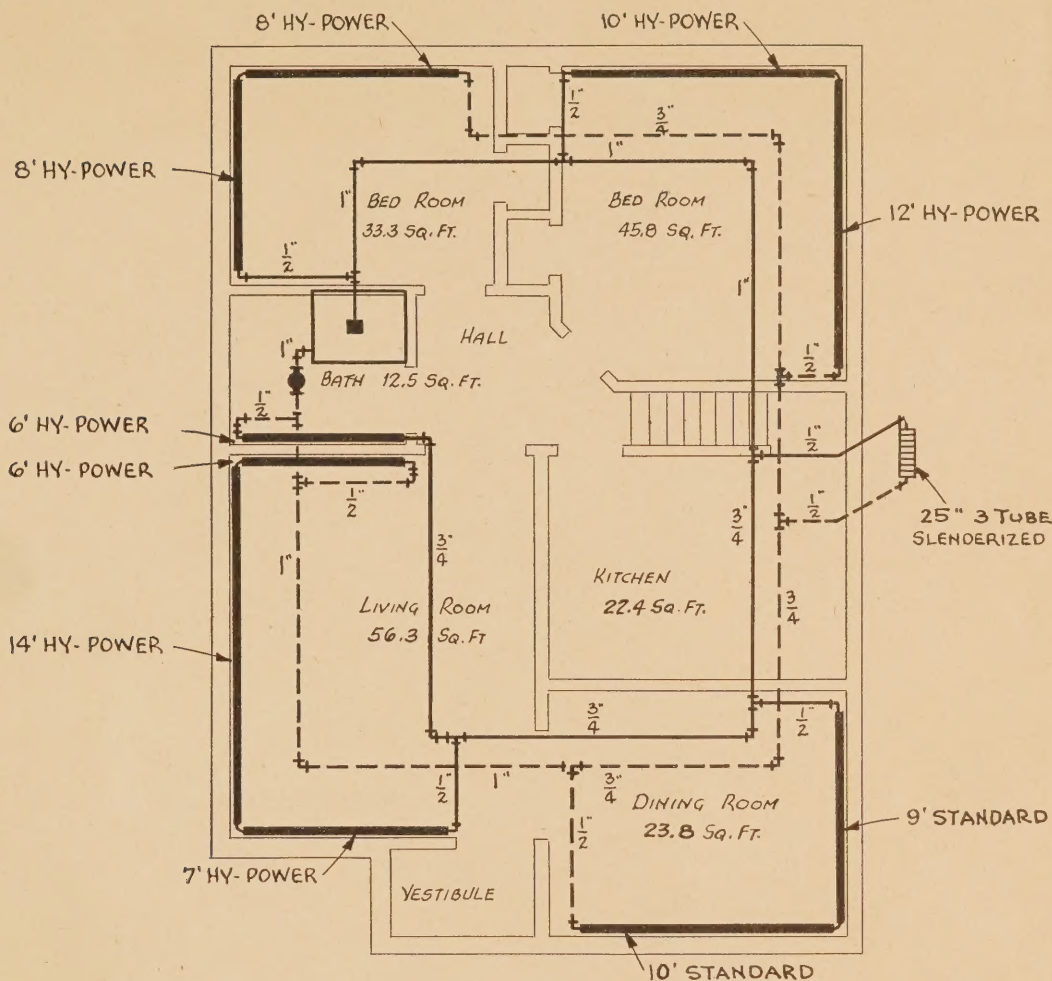
* When two or more BASE-RAY Assemblies are connected together this is a "Series".

Example—In Living Room layout on Page 7 this is a Series made up of three BASE-RAY Assemblies.

** Expansion tank sizes recommended in tables are for up to 2 story buildings.

Base-Ray—"Taco-Two" System using 194.1 sq. ft., 200 btu emission

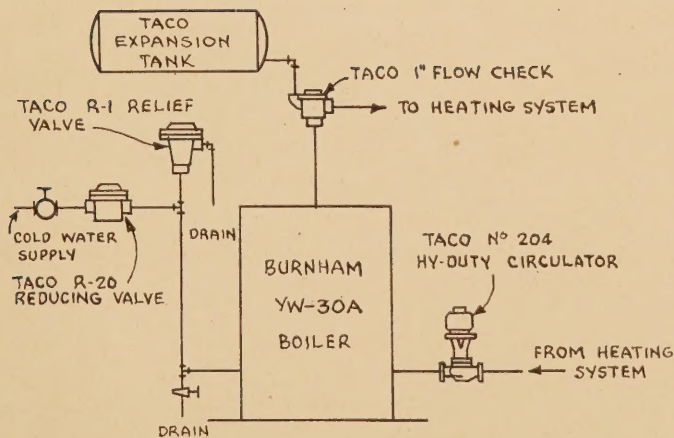
Typical Layout



Material List

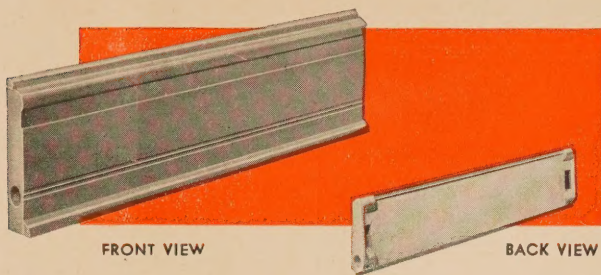
- | | |
|---|-------------------------------------|
| 1-YW 30-A Burnham Yello-Jacket Boiler | 1-#204 Taco Hy-Duty Circulator |
| 1-Biltin Taco Storage or Tankless Heater | 1-1" Taco Flow Check |
| 147.9 Sq. Ft. of HY-POWER BASE-RAY | 1-R-1 Taco Relief Valve |
| 23.8 Sq. Ft. of STANDARD BASE-RAY | 1-R-20 Taco Reducing Valve |
| 22.4 Sq. Ft. Three Tube 25" Slenderized Radiation | 1-#15 Taco Expansion Tank |
| 5-Pairs BASE-RAY Valve Enclosures | 1-1/2" or 3/4" Taco Tempering Valve |
| 5-Corner Plates | |
| 7-BASE-RAY Center Supports | |

- 70'-1" Pipe
- 90'-3/4" Pipe
- 55'-1/2" Pipe
- 5-1"x90° Elbows
- 7-3/4"x90° Elbows
- 10-1/2"x90° Elbows
- 10-1/2"x45° Elbows
- 12-1/2" Radiator Union Elbows
- 5-3/4" Radiator Union Elbows
- 6-1" Tees
- 4-3/4" Tees
- 5-3/4" Close Nipples
- 11-Key Air Valves



The Base-Ray - Taco Radiant Heat Family

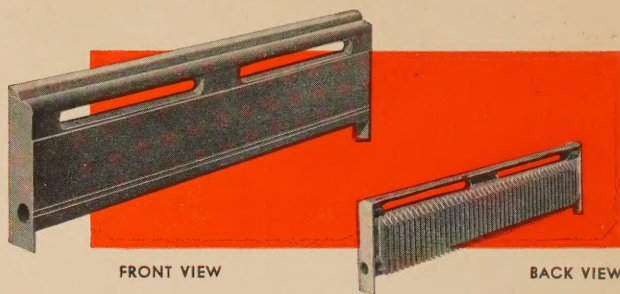
STANDARD BASE-RAY



FRONT VIEW

BACK VIEW

HY-POWER BASE-RAY

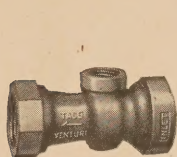


FRONT VIEW

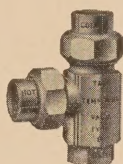
BACK VIEW

Just as important as the soundness of the engineering reflected in the previous pages of this booklet, are the quality of the products used in the different systems, and the integrity of the manufacturers.

We believe that the successful operation of Burnham and Taco products over the years and the makers' reputation for fair dealing with the trade will allow contractors to install with confidence the new BASE-RAY - TACO radiant heating systems described in this booklet.

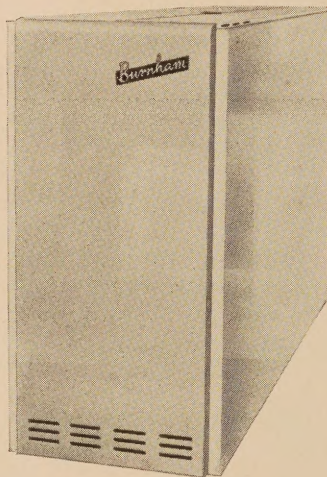


TACO-VENTURI FITTING



TYPE "S" TACO TEMPERING VALVE

BURNHAM YELLO-JACKET



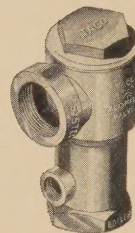
TACO RELIEF VALVE



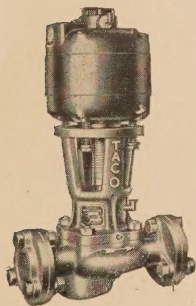
TACO REDUCING VALVE



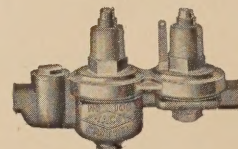
TACO FLOW CHECK



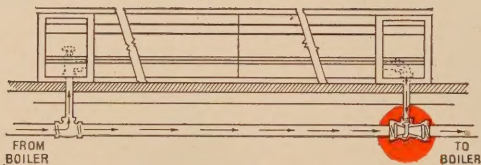
TACO-MATIC VALVE



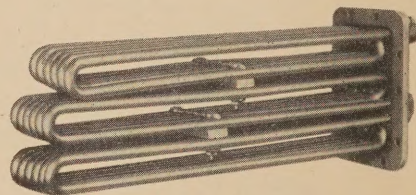
CIRCULATOR
TACO HY-DUTY



No. 100 TACO CONTROL



Only one Taco Venturi Fitting needed for each unit of BASE-RAY.



BILT-IN TANKLESS TACO

Better Heating - Better with Taco



TACO HEATERS, Inc., 342 Madison Ave., New York
In Canada: Taco Heaters of Canada, Ltd., 24 Adelaide Street W., Toronto